CLAIMS:

1. A multi-piece solid golf ball comprising a solid core, a mantle of at least one layer, and a cover, wherein

the solid core is made of a rubber composition comprising (A) 100 parts by weight of a base rubber that contains 60 to 100 wt% of a polybutadiene of at least 60% cis-1,4 structure and synthesized using a rare-earth catalyst, (B) 0.1 to 0.8 part by weight of an organic peroxide, (C) an unsaturated carboxylic acid or an unsaturated carboxylic acid metal salt or both, (D) an organic sulfur compound and (E) an inorganic filler, has a deflection when subjected to a load of 980 N (100 kgf) of 3.0 to 6.0 mm, and has a diameter of 30 to 40 mm;

the mantle of at least one layer is made of a thermoplastic resin composition, has a thickness per layer of 0.5 to 2.0 mm, and includes an outermost layer which is in contact with the cover and has a Shore D hardness of 20 to 60;

the cover is made of a material composed of a heated mixture of (F) at least one selected from the group consisting of olefin/unsaturated carboxylic acid copolymers, olefin/unsaturated carboxylic acid/unsaturated carboxylic acid ester copolymers, and metal ion neutralization products thereof, (G) a polyurethane elastomer and (H) an organic or inorganic basic compound, has a thickness of 0.5 to 2.5 mm and a Shore D hardness of 50 to 70, and satisfies the condition (Shore D hardness of mantle outermost layer) $\leq$ (Shore D hardness of cover); and

the golf ball has a deflection when subjected to a load of 980 N (100 kgf) of 3.0 to 5.0 mm.

2. The golf ball of claim 1, wherein the polybutadiene is a modified polybutadiene prepared by synthesis using a neodymium catalyst, followed by reaction with a terminal modifier.

3. The golf ball of claim 1, wherein the rubber composition includes:

(A) 100 parts by weight of a base rubber containing 60 to 100 wt% of a polybutadiene of at least 60% cis-1,4 structure and synthesized using a rare-earth catalyst,

(B) at least two kinds of organic peroxide,

(C) 10 to 60 parts by weight of an unsaturated carboxylic acid or an unsaturated carboxylic acid metal salt or both,

(D) 0.1 to 5 parts by weight of an organic sulfur compound, and

(E) 5 to 80 parts by weight of an inorganic filler.

4. The golf ball of claim 1, wherein the thermoplastic resin composition comprises:

100 parts by weight of resin components which include

a base resin of (P) an olefin/unsaturated carboxylic acid binary random copolymer or a metal ion neutralization product of an olefin/unsaturated carboxylic acid binary random copolymer or both in admixture with (Q) an olefin/unsaturated carboxylic acid/unsaturated carboxylic acid ester ternary random copolymer or a metal ion neutralization product of an olefin/unsaturated carboxylic acid/unsaturated carboxylic acid ester ternary random copolymer or both in a weight ratio P/Q of 100:0 to 25:75, and

(R) a non-ionomeric thermoplastic elastomer

in a weight ratio (P+Q)/R of 100:0 to 50:50;

(S) 5 to 80 parts by weight of a fatty acid or fatty acid derivative having a molecular weight of 280 to 1,500, or both; and

(T) 0.1 to 10 parts by weight of a basic inorganic metal compound capable of neutralizing un-neutralized acid groups in the base resin and component S.

5. The golf ball of claim 1, wherein the thermoplastic resin composition is a polyester elastomer.

6. The golf ball of claim 1, wherein the mantle consists of an inner layer and an outer layer.

7. The golf ball of claim 1 wherein the cover bears on a surface thereof a plurality of dimples, each dimple having a spatial volume below a planar surface circumscribed by an edge of the dimple and having a surface area circumscribed by the dimple edge on a hypothetical sphere represented by the surface of the golf ball cover were it to have no dimples; which golf ball has a dimple volume occupancy VR, defined as the ratio of the sum of the individual dimple volumes to the volume of the hypothetical sphere, of 0.70 to 1.00%, and a dimple surface coverage SR, defined as the ratio of the sum of the individual dimple surface areas to the surface area of the hypothetical sphere, of 70 to 85%.